transfund NEW ZEALAND
ARATAKI AOTEAROA

SUMMARY OF

FOUR 1996 EXISTING ROADS SAFETY AUDITS

Review and Audit Division
Report No. RA96/565S

Report No. RA96/565S AU1-0020

TRANSFUND NEW ZEALAND

SUMMARY OF FOUR 1996 EXISTING ROADS SAFETY AUDITS

Prepared By .....
John Hannah, Beca Carter Hollings and Ferner, Tauranga

Reviewed By .....
Ian Appleton, Safety Audit Manager

Approved By .....
P V Wright, Review and Audit Manager

April 1997

REPORT

Summary of Four 1996 Existing Road Safety Audits

Prepared for

TRANSFUND NEW ZEALAND'S
REVIEW AND AUDIT DIVISION

By

BECA CARTER HOLLINGS & FERNER LTD

Final
16 April 1997
3601706/10
36JCE277.R37

CONTENTS

PREFACE

This is a final report.

This report has been prepared for the purpose of assisting Transfund New Zealand (Transfund) to discharge its statutory responsibilities in terms of the Transit New Zealand (Transit) Amendment Act 1995 and to provide advice to the authorities concerned.

This report provides a summary of four recent audits of existing roads. These have been completed as part of the ongoing development of procedures to audit the levels of safety on roads being achieved by Road Controlling Authorities (RCA).

The procedures are not sufficiently developed and robust to enable them to be used more extensively.

EXECUTIVE SUMMARY

This report provides a summary of the audit team findings from four safety audits of existing roads conducted between April and June 1996.

The four safety audits comprised two urban and two rural safety audits. The two urban audits were conducted in Manukau City and Auckland City respectively. The two rural audits were conducted on the state highways in Central Otago and the state highways in Northland respectively. The report on each audit was not submitted to the Transfund Board.

The following common issues were identified in urban situations:

- **Pedestrian Treatments** - Inconsistencies in pedestrian refuge island conspicuity and construction
- **Directional Signage and Street Name Signage** - Wide variation in standards and general lack of signs
- **Roadmarking** - Lack of maintenance resulting in poor standards of visibility
- **Intersection Delineation and Conspicuity** - Poor roundabout markings resulting in limited conspicuity
- **Design and Construction Standards Used By Developers** - Good standards not achieved
- **Signage** - Roadworks and advertising signage not complying with standards
- **Lighting** - Inconsistent standards result in varying levels of lighting along the same route.

The following common issues were identified on the rural State Highways:

- **Guardrails** - Required to replace sightrails and installed across one lane bridges
- **Side Road Control** - Some uncontrolled requiring upgrade
- **Street Lighting** - Inconsistent level of lighting, review required
- **Advertising Signs** - Poor control of signage
- **Alignment** - Vertical curves require installation of no-overtaking lines.

1 INTRODUCTION

Safety auditing of existing roads has been developed over the past two years and draft procedures to undertake these in a consistent manner have been prepared. The background to this development has been previously reported in the following review and audit reports.

95/434S Safety Auditing of Existing Roads
Review of Process Development and Internal Implementation

95/453S Safety Auditing of Existing Roads
Draft Procedures February 1996

The former was considered by the Transit Authority (Submission 96/3/2247) which set out the background and recommendations for ongoing development. The recommendations were adopted.

This was followed by the development and distribution of draft procedures to all Transit Regional Offices, their Consultants, Local Authorities and any interested parties who requested them.

Safety Auditing of Existing Roads involves an independent team of three safety engineers who are not familiar with the roading network completing inspections of a sample of the network. The roads to be inspected are selected by the audit team to give a good cross-section of the roading network covering the various hierarchy and traffic densities. The objective of the audits is to determine the general state of road safety by noting details of potentially hazardous features on the sample of the network, which then enables general issues to be identified. The audit team is accompanied by a representative of the Road Controlling Authority (RCA).

During the latter part of the 1995/96 financial year four further audits were undertaken. Two were on State Highways in Rural areas and two in large Urban areas (Auckland, Manukau). The procedures had previously been used in several rural situations but experience, particularly in large urban situations, was limited. Confidence in their appropriateness was, therefore, still in doubt. Because the procedures were still being developed the detailed reports were not submitted to the Transit Authority or the Transfund Board but have been provided to the RCA for their information and use.

This report provides a summary of the audit team findings from four safety audits of existing roads conducted between April and June 1996.

The four safety audits of existing roads conducted are as follows:

- Northland State Highways - undertaken between 22 & 24 April 1996 (Report No. 95/471S)
- Manukau City - undertaken between 1 & 3 May 1996 (Report No. 95/472S)
- Central Otago State Highways - undertaken between 29 & 31 May 1996 (Report No. 95/473S)
- Auckland City - undertaken between 12 & 14 June 1996 (Report No. 95/484S)

2 DESCRIPTION OF THE AUDIT AREAS

2.1 MANUKAU CITY

Detailed inspections were undertaken on a cross-section of urban/rural and major/minor roads as well as some general residential and industrial areas.

The following routes and areas were inspected:

- Route A — Hollyford Drive to Pakuranga Road (via Matthew's Road, Chappell Road, Botany Road, Cascades Road and Aviemore Drive).
- Route B — Whitford Road (East Tamaki Road to Whitford)
- Route C — Great South Road (Mahia Road, Manurewa to Charles Road, Papatoetoe)
- Route D — Papatoetoe to Mangere (Old State Highway 20)
- Area A — Wiri Industrial Area
- Area B — Homai Residential Area
- Area C — Weymouth Residential Area
- Area D — Mangere Bridge Residential Area

2.2 AUCKLAND CITY

A sample of regional and district arterials and one collector road, situated throughout the city, was selected for audit.

The following routes were inspected:

- Route A — Tamaki Road, Ngapipi Road, Kepa Road, Kohimarama Road and St Johns Road (between St Heliers and College Road)
- Route B — St Johns Road (from College Road), Remuera Road and Green Lane East, Green Lane West (to Manukau Road)
- Route C — New North Road (From Symonds Street to St Lukes Road)
- Route D — Neilson Street (from Church Street to Victoria Street)
- District Arterial — Station Road from Great South Road to Mt Smart Road
- Collector Road — Victoria Street, Onehunga
- CBD
  - Beaumont Street via Victoria Street and Waterloo Quadrant to Princes Street
  - Victoria Street to Vincent Street via Albert Street

2.3 NORTHLAND STATE HIGHWAYS

The study area falls within the Transit Region 1 - Northland area. Various selected lengths of State Highways in Northland were audited, traffic volumes varying between 580 and 6,800 vehicles per day. The highway environment is predominantly rolling and open with some hilly sections.

The following lengths were inspected:

- SH1F Pukenui to Awanui
- SH1 Clough Road to Mangamuka Summit
- SH1 North of Whangarei to SH10
- SH10 SH1 to Waimate North Road
- SH10 Cable Bay to Awanui
- SH12 Opononi
- SH12 Kaihu to Dargaville (overview only)
- SH14 Dargaville, South to Tangowahine Valley Road

2.4 CENTRAL OTAGO

The study area falls within Transit Region 13 - Central Otago. Traffic volumes on the selected state highway sections ranged between 300 and 10,000 vehicles per day. The western half of the region has rolling to mountainous terrain whereas in the east the countryside is more rolling and open.

The following lengths were inspected:

- SH6 Haast Pass to Cromwell
- SH6 Roaring Meg to Kawarau Bridge
- SH6A Frankton to Queenstown
- SH8 Cromwell to Alexandra
- SH8B Cromwell
- SH85 Ranfurly to Alexandra

3 AUDIT FINDINGS

The detailed audit reports are presented in a format which sets out a summary of findings based on specific observations made on a sample of the roading network.

Findings are based on a sample. No attempt has been made to establish the statistical reliability of the sample selected in each area. However, in the wider general travel by the team throughout each RCA's area and the informal observations that occur during such time, nothing has indicated that the findings of the formal audit of the sample were not representative of the whole.

The report format is still evolving and comments are being sought from the RCA's which have been audited.

3.1 URBAN SAFETY AUDITS

From the two safety audits conducted in urban areas (Manukau City and Auckland City) the following key issues were identified. These issues may not be specific to each Authority.

As previously noted the draft audit procedures have been used in several rural authorities and there is a large degree of confidence in their appropriateness in rural situations.

The two major urban authorities were very much being used as a trial.

This trial has shown that with some minor (urban) modifications the procedures can adequately provide a good indication of the potentially hazardous features within an urban RCA.

- **Street Lighting:** Inconsistencies with the street lighting was observed on some routes. Some intersections had flaglighting while others did not. Some portions of routes did not have any street lighting at all. Care needs to be taken to ensure that the illumination of the road is sufficient to provide the road users with a clear definition of the road corridor. The teams noted some variation in pole placement, with some new poles placed close to the kerb while others were set well back on the boundary. The poles close to the kerb require hazard markers on them. The team were advised that in some cases the location of the pole is governed by underground services. It was noted by the teams that in both cities the street lighting is being progressively upgraded. These programmes require review to ensure that they are targeting the appropriate routes according to priority.

- **Pedestrian Treatments:** One team noted with concern that in numerous locations along one route, pedestrian crossings had been marked through free left turns at signalised intersections. This does not comply with Section 3.14 Figure 3.23 of Transit's "Manual of Traffic Signs and Markings". Inconsistencies in conspicuity and construction of pedestrian refuge islands were observed. It was recommended that the AUSTROAD's design standard for refuge islands be adopted by the RCA's. Where pedestrian treatments have been installed as part of recent road upgrading projects they are of a high standard.

- **Directional Signage and Street Name Signage:** In both cities, the directional signage was poor. Throughout the whole of a major link, there was almost no directional signage. There was a wide variation in the standards of street name signage, a significant portion was either very poor or missing altogether. Some street name plates were located inappropriately (eg. behind traffic signal aspect lanterns). It was recommended to the RCA's that definitive upgrade programmes be considered or

maintained (in particular on all arterial roads). Directional and street name signage is important for safety as it enables drivers to make clear decisions about where they are going.

- **Road Marking:** The standard of road marking was poor due to lack of maintenance. This resulted in the visibility of roadmarking being inconsistent. In one location an old lane line which is no longer required is still marked. This may cause confusion to some motorists.

  One wide 4 lane major arterial lacks good lane delineation to correctly position and guide through-traffic.

  The teams also noted the variable use of Raised Reflective Pavement Markers for delineating lane lines.

- **Road Surface Condition:** One major route observed had virtually no edge delineation and was in very poor condition due to a failing and substandard width pavement. This made it impossible to maintain road markings. The pavement appeared to need shape correction as it was requiring continual maintenance. It provides a substandard level of safety for the traffic volumes on it because of the surface condition, lack of markings and its substandard pavement width.

- **Intersection Delineation and Conspicuity:** The teams noted the poor delineation and conspicuity of numerous roundabouts, none of which had markings and signage in accordance with Section 13.12 of Transit's "Manual of Traffic Signs and Markings" Part II. The maintenance of side road control signs and markings was also poor and needs attention.

- **Design and Construction Standards Used By Developers:** In the vicinity of a recent large development good traffic engineering standards have not been achieved eg. inadequate weave space and merge areas. These new developments include portions of road which become part of the RCA's roading network.

- **Signage:** The team noted that the signage of roadworks by utility companies was not to the standard set out in Transit's "Working on the Road". Some advertising signage was noted by the teams as non-complying (with the Land Transport Safety Authority's Road and Traffic Standards 7 "Guidelines for Advertising Signs"). The councils should make every effort to keep undesirable advertising off the streets, as well as enforcing the requirements for temporary traffic control and safety at roadworks sites.

3.2 RURAL SAFETY AUDITS

From the two safety audits conducted on State Highways in rural areas (Northland and Central Otago) the following key issues were identified. These issues may not be specific to each authority.

The draft procedures have been used in several rural situations and are now considered to be proven as an appropriate method to audit the safety provisions of an existing rural roading network.

- **Guardrails:** Guardrailing was a concern to the teams in both regions.

  At narrow bridges where there is no guardrailing there are unprotected concrete posts and kerbs presenting potentially dangerous situations.

  It was noted in several locations that pavement overlays had resulted in the guardrailing now being too low.

  There were numerous locations other than at bridges where, in the opinion of the team, guardrailing should be installed.

  The teams have noted on these and previous audits that there is no standard or guide setting out where guardrailing should be installed.

- **Side Road Control:** The teams identified some intersections which had no side road control. One in particular was in a crossroads situation with no control on either side road. Programmes of considering and implementing appropriate intersection control on all side roads joining state highways were recommended.

- **Street Lighting:** In remote urban areas the level of street lighting was generally very low, with the road surface and side roads failing to be illuminated effectively.

  A review of street lighting particularly in small rural towns and the urban fringe of larger towns is suggested to achieve an appropriate and consistent standard of lighting.

  On these and previous audits the lack of lighting and edge marker posts on the fringe areas of urban development has been a consistent problem.

  Although the standard of lighting at rural intersections was generally well done there was some inconsistency.

- **Advertising Signs:** A proliferation of advertising signage alongside state highways can cause motorists to become distracted and pay less attention to the road. Rural/remote advertising signs were noted to be prevalent in various areas. There were also several instances where advertising signs conflicted with road signs by obscuring them or being of a similar colour. The teams recommended reviewing signs that do not comply with accepted criteria. Consideration of replacing tourist advertising signs with standard tourism information signs where appropriate was also suggested.

- **Alignment:** There were several examples where poor highway alignment could be a contributing factor to road crashes. In some locations this could be assisted in the interim by the installation of appropriate curve and hazard warning signage.

4 CONCLUSION

4.1 PROGRESS TO DATE

Subsequent to completing the audits discussed in the report 3 more formal audits have been completed and will be reported on separately. This now results in a total of 14 audits having been completed since the first trials of the process in February 1995.

The procedures for rural areas are now robust. They are appropriate for determining the standard of infrastructural road safety provisions. The audit teams have no difficulty in completing the task, nor do the RCA's dispute the findings.

Although fewer audits have been completed in urban areas the procedures, which have been adapted from those for the rural environment, are also working well. There can be confidence that the findings provide a valid general representation of safety standards. The completion of more urban audits will add further to this confidence and perhaps result in some further minor modifications to the procedures.

An attempt was made to audit a portion of the Central Business District in Auckland but this was very difficult due to the traffic volumes and intense nature of the roading environment. There is some doubt as to the worth of attempting a generalised audit of this type of area which may be better suited to a specific intense review of road safety on a detailed street by street basis. In these situations, crashes which could be reduced by engineering are most likely to be confined to property or minor injury consequences.

The report format is still evolving and feedback is required from recipients to either confirm agreement with it or suggest changes. A key part of the reports is the recommendations, and specific feedback is required as to how realistic they are and whether they are likely to be implemented, albeit over a five to ten year timeframe.

The Audit Team composition is very important requiring members to be experienced traffic engineers as well as being independent and not familiar with the network being audited. Team members must be experienced with the management and operation of the particular type of network (urban or rural) and be able to draw generalities from a series of very specific issues.

Recommendations for improvement to or the development of standards or guidelines have been made. A process has been set up to pass these issues on to the appropriate authorities for their consideration.

The assistance and co-operation of the various staff and consultants of the RCA's which have been involved to date is noted and appreciated. Without their involvement the development of these procedures would have been very difficult.

4.2 THE FUTURE

- **The Procedures**

  There is still some work to be done to finalise the draft procedures. In particular this will involve a review of the checksheets used by the auditors. This could be advanced by convening a workshop of Auditors or establishing a working party which could contribute to this process.

- **Comparison of Audits**

  To enable comparative judgements to be made both between RCA's and between subsequent audits of the same RCA a method is being developed to assign a ranking to the various hazards identified. Guidelines as to the classification of hazards and the consistency of their treatment by auditors also need to be developed. Given these it may be possible to develop national performance measures related to the RCA's contribution to road safety.

- **Frequency of Audits**

  For an auditing process to be useful and its outcomes monitored it is vital for audits to be completed on a regular basis. In many of the audits completed to date recommendations have been made to RCA's to develop programmes for improvements to particular elements over a period of time (five or ten years).

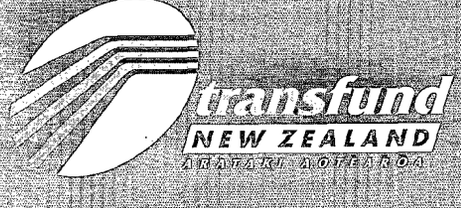
  For Transfund to be confident that RCA's are responding responsibly to these recommendations it is considered that it should aim to complete an audit on each RCA on the average of once every five years. This would enable progress to be monitored and reported on.

Report Prepared by
John JT Hannah

Signature : _____

Report Reviewed by
Jon England

Signature : _____


transfund
NEW ZEALAND